

# **INSERT REINFORCED HANGING HOOK ON THERMOFORMED PRODUCT**

Inventor: Paul Neiffer

## **Background**

[001] To display swimsuits for sale in stores, it is well known to create an inexpensive low relief form in the shape of a human torso and display the swimsuit on the form as if the suit were on a human body. Relief in the form can be so low as to be virtually flat, such as a cutout of one-quarter inch thick foam; or the relief can be so high as to be a nearly full round human torso as can be made with an inflated structure. Preferably, a hanging hook is included and the total relief is about one inch, which is enough to illustrate the shape and yet not require too much space in a hanging rack for each swimsuit. The hanging object to which the hook is attached can be any object, not just a torso form.

[002] Preferably, the hanging product is made by thermoforming a thin sheet of plastic such as PVC or PET and adding a hook. However, if the hook is made of the same thermoformed plastic, it is not strong enough. To solve this problem, it is known to use PVC to make the form and a single layer in the hook and then weld to the hook an additional hook-shaped piece of plastic of a weldable material, such as PVC. The welding is preferably done with radio frequency (RF) heating but can also be done with sonic heating or impulse thermal heating.

## **Summary of Invention**

[003] In one aspect, the invention is an improved hanging hook on a thermoformed product which is made strong by use of an insert snapped into one or more recesses in the hook portion of the thermoformed product. This presents many advantages over the weld reinforced hook.

[004] The insert reinforced hook requires less labor to manufacture than the weld reinforced hook. The manufacturing process does not require special tooling, such

as for RF welding or sonic welding or thermal impulse welding, and does not require a welding machine.

[005] The prior method of making hanging hooks on thermoformed products using RF equipment leaves nicks on the surface of the hook which tend to snag types of clothing that are easily snagged, such as is typical for swimsuits. The outer surfaces of the insert-reinforced hanging hook consist of only the thermoformed product material which presents no greater likelihood of a snagging nick on the hook portion than on the body portion of the thermoformed product, because the insert nestles inside a recess in the hook and it does not touch the clothing.

[006] In addition, PVC which has been a preferred material in the past because it welds very well, is presently disfavored for environmental reasons. PET (polyethylene terephthalate) is currently the favored material, but it welds poorly. The invented insert reinforced hanging hook works very well with PET because no welding is required.

[007] In another aspect, the invention is a method of making an insert reinforced hook comprising the steps of thermoforming a hook at one edge of a thermoformed product and thermoforming a recess in the hook, then snapping into the recess a reinforcing insert that is frictionally retained within the recess.

### **Brief Description of the Drawings**

[008] The features of the present invention which are believed to be novel are set forth with particularity in the appended claims. Aspects of the invention, together with further objects and advantages thereof, may best be understood by making reference to the following description taken in conjunction with the accompanying drawings wherein:

[009] Figure 1 shows a typical thermoformed product with a hanging hook.

[010] Figure 2 shows details of the hanging hook.

## **Detailed Description**

[011] In the following detailed description of exemplary embodiments of the invention, reference is made to the accompanying drawings. The detailed description and the drawings illustrate specific exemplary embodiments by which the invention may be practiced. Other embodiments may be utilized, and other changes may be made, without departing from the spirit or scope of the present invention. The following detailed description is therefore not to be taken in a limiting sense, and the scope of the present invention is defined by the stated claims.

[012] Figure 1 shows a thermoformed product with a hanging hook for hanging the product. Within the scope of the invention, the thermoformed product 1 can be of any shape that can be produced by a thermoform process. In figure 1, the thermoformed product is a human torso for displaying a swimsuit for sale. The thermoformed product 1 can be any other form on which a product for sale is wrapped or hung or can be an enclosure for holding a product inside it, such as a clamshell enclosure. As shown in Figure 1, the thermoformed product includes a hook 2 for hanging the product on a bar.

[013] Figure 2 shows the front side of the hook 2. Before an insert 3 is placed into a recess in the hook 2, the hook is formed with the material of the thermoformed product 1 and a recess is formed in the hook creating a rim 4 surrounding the recess. The material of the thermoformed product 1 extends across the floor of the recess inside the rim 4.

[014] The insert 3 may be formed of any suitable material. It may be stamped, injection molded, or thermoformed. The insert can have a color that is different from the product to add visual interest or identify product categories. For ease of manufacture, the insert may be made in the same thermoform process as the product by carving an additional recess in the thermoforming mold where there is excess thermoformable plastic material, such as beside the hook. If the hook is made with a straight vertical edge at the back of the hook, the insert can be made in mirror image shape but a bit smaller and with its straight edge adjoining the straight edge of the hook so that the insert can be put in place by folding along the common straight edge until the insert is nestled in the recess in the hook.

[015] So that it does not need to be welded or glued and still will not fall out, the insert 3 should be made in a shape that will fit snuggly and be retained by friction in the recess. One method to ensure effective frictional retention of the insert is to form one or more “snaps” 5 in the material of the thermoformed product 1 and in the material of the insert 3. Each snap 5 is formed by creating a recess in one material with nearly vertical walls and a raised portion in the other material with nearly vertical walls that fits snuggly into the recess in the first material. Which material has the raised portion and which material has the recess is interchangeable. As shown in figure 2, for ease of assembly, the raised portions are in the insert 3 and the recesses are in the recess in the hook formed of the material of the thermoformed product 1.

[016] If the insert 3 is made by thermoforming or injection molding, the part can be made stronger and stiffer by forming recesses and raised portions which leave nearly vertical walls between them to add strength like an L-shaped beam. As shown in figure 2, the recess 3 includes three raised portions 6 surrounded by recess portions to created stiffening L-shaped portions of the insert 3. To further assist stiffening and provide support to add strength to the rim 4 of the hook 2, the insert 3 includes a raised perimeter 7 that contacts the rim 4. The raised perimeter 7 of the insert 3 provides an L-beam shape around the perimeter of the insert and provides affirmative contact with the rim 4 to strengthen the rim.

[017] Although the present invention has been described in considerable detail with reference to certain preferred embodiments, other embodiments are possible. Therefore, the spirit or scope of the appended claims should not be limited to the description of the embodiments contained herein. It is intended that the invention resides in the claims hereinafter appended.